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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/824,751	04/15/2004	Patrick H. Dussud	MS1-1962US	7046

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EXAMINER

SAVLA, ARPAN P

ART UNIT PAPER NUMBER

2185

DATE MAILED: 10/23/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/824,751

Applicant(s)

DUSSUD, PATRICK H.

Examiner

Arpan P. Savla

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2185

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 07 August 2006.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-24 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-24 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO/SB/08)
Paper No(s)/Mail Date 8/7/06.
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____.
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: _____.

DETAILED ACTION

Response to Amendment

This Office action is in response to Applicant's communication filed August 7, 2006 in response to the Office action dated May 5, 2006. Claims 1-2, 5, 8, 11-13, 15-16, 18-20, and 22-24 have been amended. Claims 1-24 are pending in this application.

OBJECTIONS

Specification

1. In view of Applicant's amendment, the objections to the specification have been withdrawn.

Claims

2. **Claim 19** is objected to because of the following informalities: The phrase "has been accessed" should read "have been accessed."

Appropriate correction is required.

REJECTIONS NOT BASED ON PRIOR ART

Claim Rejections - 35 USC § 101

3. 35 U.S.C. 101 reads as follows:

Whoever invents or discovers any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof, may obtain a patent therefor, subject to the conditions and requirements of this title.

4. **Claims 1-11** are rejected under 35 U.S.C. 101 because the claimed invention is directed to non-statutory subject matter. Claims 1-11 are not limited to tangible

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embodiments. In view of Applicant's disclosure, paragraphs 0023 and 0025, the computer readable medium is not limited to tangible embodiments, instead being defined as including both tangible embodiments (e.g. RAM, ROM, EEPROM, flash memory or other memory technology, CD-ROM, digital versatile disks (DVD) or other optical storage, magnetic cassettes, magnetic tape, magnetic disk storage or other magnetic storage devices) and intangible embodiments (e.g. modulated data signal, such as a carrier wave or wireless media such as acoustic, RF, infrared and other wireless media, etc.). As such, claims 1-11 are not limited to statutory subject matter and are therefore non-statutory. *It should be noted that intangible embodiments of the computer-readable medium such as modulated data signals and wireless media are accessible by a computing device.*

5. In view of Applicant's amendment, the 101 rejections to **claims 19-24** have been withdrawn.

Claim Rejections - 35 USC § 112

6. In view of Applicant's amendment, the 112, 1st paragraph rejection to **claim 18** has been withdrawn.

7. In view of Applicant's amendment, the 112, 2nd paragraph rejections to **claims 19-24** have been withdrawn.

REJECTIONS BASED ON PRIOR ART

Claim Rejections - 35 USC § 102

8. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

9. **Claims 1-24 are rejected under U.S.C. 102(b) as being anticipated by Grarup et al. (U.S. Patent 6,308,185).**

10. **As per claim 1**, Grarup discloses a computer-readable medium having computer-executable instructions for performing ephemeral garbage collection, the computer readable medium being accessible by a computing device (col. 17, lines 31-61; Fig. 9), the instructions comprising:

requesting a list from a tracking mechanism, the list identifying memory locations that have been written into since the last ephemeral garbage collection (col. 9, lines 42-57; col. 10, line 65 – col. 11, line 1; Fig. 4b, element 452), each memory location corresponding to one of a plurality of cards associated with a card table (col. 8, lines 64-67; Fig. 4b, elements 408 and 420), each card being associated with one or more objects allocated from within a memory heap (col. 7, lines 58-60; Fig. 4a, element 408). *It should be noted that the "cark mark" is analogous to the "list" and the "car" is analogous to the "card table." It should also be noted that the instructions within the computer program that manage the card marks provide the functionality of a "tracking*

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mechanism.” Lastly, it should also be noted that in order to search the card mark it is inherently required the card mark be requested.

identifying at least one marked bundle based on the list, wherein the marked bundle represents a subset of the plurality of cards (col. 11, lines 18-21; Fig. 5, element 512);

for each marked bundle, determining at least one marked card within the bundle (col. 12, lines 56-61; Fig. 7a, elements 703 and 704);

for each marked card, determining at least one accessed object within the marked card (col. 12, line 66 – col. 13, line 1; Fig. 7a, element 708); *It should be noted that “dirty” indicates “accessed.”*

and performing garbage collection upon the at least one accessed object (col. 13, lines 1-4; Figs. 7b-7e).

11. **As per claim 2**, Grarup discloses the tracking mechanism comprises a write-watch mechanism (col. 9, lines 42-57). *It should be noted that the instructions within the computer program that manage the card marks provide the functionality of a “write-watch mechanism.”*

12. **As per claim 3**, Grarup discloses the write-watch mechanism operates within a memory manager (col. 9, lines 42-57; col. 17, lines 34-41; Fig. 9, element 932). *It should be noted that the instructions within the computer program that manage the card marks operate within the processor, thus, the processor is analogous to the “memory manager.”*

13. **As per claim 4**, Grarup discloses the write-watch mechanism records a first access to the memory location (col. 9, lines 42-57).
14. **As per claim 5**, Grarup discloses the list comprises a bitmap and each bit within the bitmap corresponds to one of the plurality of cards (col. 9, lines 37-57).
15. **As per claim 6**, Grarup discloses the list of memory locations is maintained in response to a request from the ephemeral garbage collection process (col. 10, line 65 – col. 11, line 1). *See the citation note for the first limitation of claim 1 above.*
16. **As per claim 7**, Grarup discloses resetting the list of memory locations (col. 12, lines 62-66; Fig. 7a, element 707). *It should be noted that “clean” is analogous to “reset.”*
17. **As per claim 8**, Grarup discloses the subset of cards corresponds to a number of cards that are tracked using a page of memory storing the card table (col. 8, lines 64-67; col. 11, lines 18-21; Fig. 4b, elements 408 and 420; Fig. 5, element 512).
18. **As per claim 9**, Grarup discloses identifying the marked bundle comprises marking a bit associated with the marked bundle within a bundle bitmap based on the memory locations within the list (col. 11, lines 18-25; Fig. 5, elements 512 and 514).
19. **As per claim 10**, Grarup discloses marking the bit comprises setting the bit (col. 10, lines 22-25; Fig. 5, element 514).
20. **As per claim 11**, Grarup discloses determining the at least one marked card comprises scanning a card bitmap having a bit for each of the plurality of cards, the bit for each marked card being different than another bit associated with one of the cards that was not accessed (col. 12, lines 56-61; Fig. 7a, elements 703 and 704). *It should*

be noted that an accessed card has a "dirty" bit associated with it which is different than non-accessed card which has a "clean" bit associated with it.

21. **As per claim 12**, Grarup discloses a method for executing statements within a program to support ephemeral garbage collection, the method comprising:

specifying a range of card table memory to watch during program execution (col. 9, lines 25-32; Fig. 4b, elements 460 and 464), the card table memory identifying a plurality of cards (col. 8, lines 64-67; col. 9, lines 33-37; Fig. 4b, elements 408, 420 and 452), each card being associated with one or more objects allocated within a memory heap (col. 7, lines 58-60; Fig. 4a, element 408), the memory heap being divided into a plurality of cards with each card being grouped into one of a plurality of bundles (col. 8, lines 64-67; Fig. 4b, elements 408 and 420). *It should be noted that a "remembered set" specifies a range of card table memory to watch during program execution. Also, see the citation note for the first limitation in claim 1 above.*

and for each store statement within the program, storing a value at a memory location within the heap memory based on the store statement (col. 11, lines 17-21; Fig. 5, element 504), marking one of the plurality of cards within the card table memory based on the memory location (col. 11, lines 21-25; Fig. 5, elements 512 and 514), and tracking access to the card table memory (col. 12, line 66 – col. 13, line 1; Fig. 7a, element 708).

22. **As per claim 13**, Grarup discloses specifying the range of card table memory includes calling a write-watch mechanism that performs tracking of the accesses to card table memory (col. 9, lines 42-57). *See the citation note for claim 2 above.*

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23. **As per claim 14**, Grarup discloses the write-watch mechanism resides within a memory manager (col. 9, lines 42-57; col. 17, lines 34-41; Fig. 9, element 932). *See the citation note for claim 3 above.*

24. **As per claim 15**, Grarup discloses a bundle corresponds to a number of cards that are tracked using a page of card table memory (col. 8, lines 64-67; col. 11, lines 18-21; Fig. 4b, elements 408 and 420; Fig. 5, element 512).

25. **As per claim 16**, Grarup discloses the write-watch mechanism maintains a list that identifies cards accessed within the card table memory (col. 9, lines 42-57; Fig. 4b, element 452).

26. **As per claim 17**, Grarup discloses an ephemeral garbage collection process requests the list when performing a garbage collection cycle (col. 10, line 65 – col. 11, line 1). *See the citation note for the first limitation of claim 1 above.*

27. **As per claim 18**, Grarup discloses the ephemeral garbage collection process determines a marked bundle based on the list (col. 11, lines 18-25; Fig. 5, elements 512 and 514).

28. **As per claim 19**, Grarup discloses a system for performing ephemeral garbage collection, the system comprising:

a processor (col. 17, lines 36-38; Fig. 9, element 932);

and a memory into which a plurality of instructions are loaded and into which a plurality of objects are dynamically allocated (col. 17, lines 43-45; Fig. 9, element 934), the memory having a heap into which the objects are allocated (col. 1, lines 61-63; Fig. 1, elements 10 and 20), the heap being divided into a plurality of cards which are

grouped into a plurality of bundles (col. 8, lines 64-67; Fig. 4b, elements 408 and 420), each card being associated with one or more of the plurality of objects (col. 7, lines 58-60; Fig. 4a, element 408); wherein upon execution of the plurality of instructions by the processor, the system being configured to:

request a list from a tracking mechanism, the list identifying memory locations that have been written into since a last garbage collection cycle (col. 9, lines 42-57; col. 10, line 65 – col. 11, line 1; Fig. 4b, element 452), each memory location corresponding to one of the plurality of cards associated with a card table (col. 8, lines 64-67; Fig. 4b, elements 408 and 420); *See the citation note for the first limitation of claim 1 above.*

identify at least one marked bundle based on the list, wherein the marked bundle represents a subset of the plurality of cards (col. 11, lines 18-21; Fig. 5, element 512);

determine for each marked bundle, at least one marked card within the bundle (col. 12, lines 56-61; Fig. 7a, elements 703 and 704);

determine, for each marked card, the one or more objects that has been accessed (col. 12, line 66 – col. 13, line 1; Fig. 7a, element 708); *It should be noted that “dirty” indicates “accessed.”*

and perform garbage collection upon the one or more accessed objects (col. 13, lines 1-4; Figs. 7b-7e).

29. **As per claim 20**, Grarup discloses the tracking mechanism comprises a write-watch mechanism (col. 9, lines 42-57). *See the citation note for claim 2 above.*

30. **As per claim 21**, Grarup discloses the write-watch mechanism operates within a memory manager (col. 9, lines 42-57; col. 17, lines 34-41; Fig. 9, element 932). *See the citation note for claim 3 above.*

31. **As per claim 22**, Grarup discloses the subset of cards corresponds to a number of cards that are tracked using a page of memory storing the card table (col. 8, lines 64-67; col. 11, lines 18-21; Fig. 4b, elements 408 and 420; Fig. 5, element 512).

32. **As per claim 23**, Grarup discloses the marked bundle being identified by a marked bit associated with the marked bundle within a bundle bitmap based on the list (col. 11, lines 18-25; Fig. 5, elements 512 and 514).

33. **As per claim 24**, Grarup discloses the marked bit comprises a set bit (col. 10, lines 22-25; Fig. 5, element 514).

Response to Arguments

34. Applicant's arguments with respect to **claims 1-24** have been considered but are moot in view of the new grounds of rejection above.

Conclusion

STATUS OF CLAIMS IN THE APPLICATION

The following is a summary of the treatment and status of all claims in the application as recommended by MPEP 707.70(i):

CLAIMS REJECTED IN THE APPLICATION

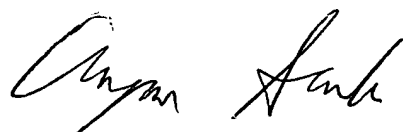
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Per the instant office action, **claims 1-24** have received a second action on the merits and are subject of a second action final.

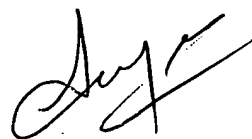
Any inquiry concerning this communication or earlier communications from the examiner should be directed to Arpan P. Savla whose telephone number is (571) 272-1077. The examiner can normally be reached on M-F 8:30-5:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Sanjiv Shah can be reached on (571) 272-4098. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.



Arpan Savla
Art Unit 2185
October 16, 2006



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